Exhibit I

Exhibit E-6

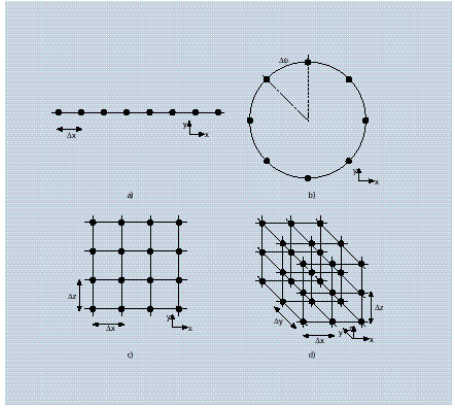
INVALIDITY CONTENTIONS FOR U.S. PATENT NO. 7,177,369 BASED ON LEHNE ("LEHNE")

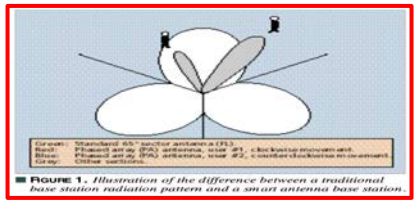
Based upon Plaintiff's Complaint, Infringement Contentions, and apparent claim constructions and application of the claims to Defendant's accused products, as best as they can be deciphered, the reference charted below anticipates or at least renders obvious the asserted claims. These invalidity contentions are not an admission by the Defendant that the accused products are covered by or infringe the asserted claims, particularly when these claims are properly construed and applied. These invalidity contentions are not an admission that the Defendant concedes or acquiesces to any claim construction implied or suggested by Plaintiff's Complaint or Infringement Contentions. Nor is Defendant asserting any claim construction positions through these charts, including whether the preamble is a limitation. The portions of the prior art reference cited below are not exhaustive but are exemplary in nature.

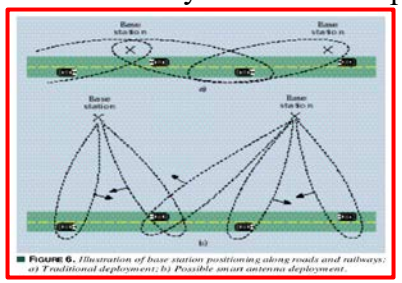
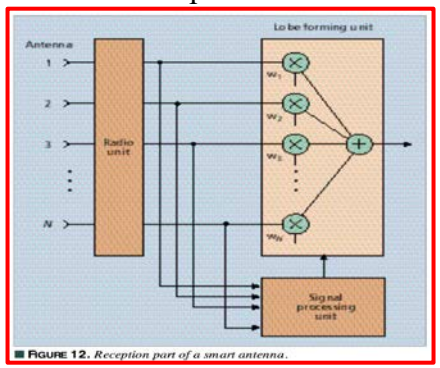
"An Overview of Smart Antenna Technology For Mobile Communications Systems," by Lehne, et al., IEEE Communications Surveys, Fourth Quarter 1999, Vol. 2, No. 4, ("Lehne") published in 1999. This reference is prior art under at least 35 U.S.C. § 102(a)(b), and 103(a). As described in the following claim chart, the asserted claims of U.S. Patent No. 7,177,369 (the "'369 Patent"), are invalid as anticipated or obvious by Lehne in combination with one or more references.

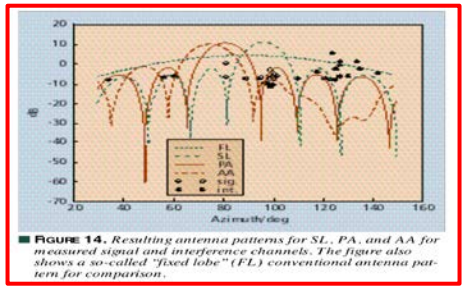
To the extent that Lehne is found not to anticipate one or more of the asserted claims of the '369 Patent, these claims are invalid as obvious in view of Lehne alone or in combination with other prior art references disclosed in Defendant's Invalidity Contentions and accompanying charts, including without limitation as set forth below.

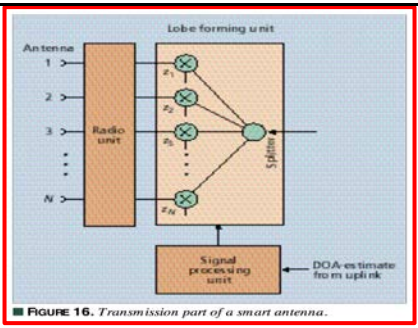
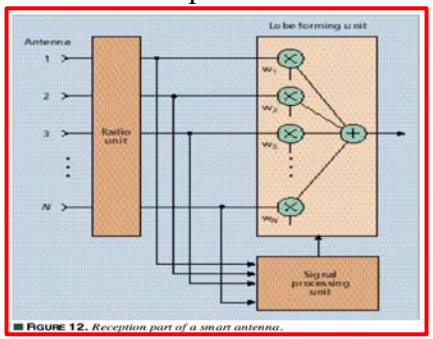
'369 Patent	**Lehne**
Claim 1	
1[p] A method comprising:	To the extent the preamble is limiting, Lehne discloses this claim limitation explicitly, inherently, or as a matter of common sense, or it would have been obvious to add missing aspects of the limitation. For example, see the following passages and/or figures, as well as all related disclosures: Lehne discloses the known antenna technologies as of 1999 that could be used with transmitting devices such as base stations. Prior to the '369 patent, the techniques and knowledge disclosed in Lehne would be known to a person of ordinary skill in the art. Thus, when viewing any reference discussing wireless transmissions from, for example, base stations using antennas, that reference (in view of the knowledge

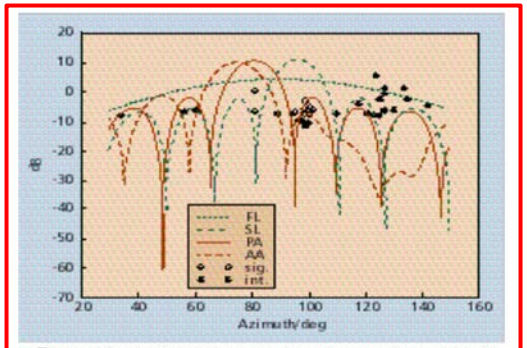
'369 Patent	Lehne
	of a person of ordinary skill in the art) would include the disclosure of Lehne and/or it would be obvious to include the disclosure of Lehne with that reference. E.g., p. 12 (discussing the 1999 (and before) usage of the technology disclosed in Lehne in functioning systems). Figure 5 shows an existent example of an array antenna:  Lehne discloses various array geometries for its smart antennas. See Figure 13:  FIGURE 13. Different array geometries for smart antennas: a) uniform linear array; b) circular array; c) 2 dimensiona1 grid array; d) 3 dimensioan1 grid array.

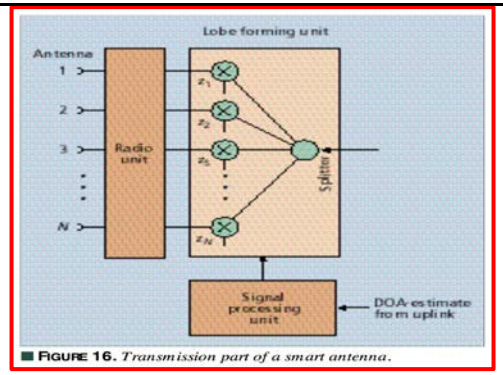
'369 Patent	Lehne
	See, e.g., p. at 2: "Base station antennas have up till now been omnidirectional or sectored" but "The idea of smart antennas is to use base station antenna patterns that are not fixed, but adapt to the current radio conditions" as "can be visualized as the antenna directing a beam toward the communication partner only" wherein "The difference between the fixed and the smart antenna concept is illustrated in Fig. 1."  "The last state in the development will be full *space division multiple access* (SDMA)." This implies that more than one user can be allocated to the same physical communications channel simultaneously in the same cell, only separated by angle. In a TDMA system, two users will be allocated to the same time slot and carrier frequency at the same time and in the same cell." p. 5: "Because smart antennas will be more directive than traditional sector or omnidirectional antennas, a range increase potential is available. This means that base stations can be placed further apart, potentially leading to a more cost-efficient deployment. The antenna gain compared to a single element antenna can be increased by an amount equal to the number of array elements, e.g., an eight-element array can provide a gain of eight (9 dB)." p.5: Lehne states that "Smart antennas" also "put new demands on network functions such as resource and mobility management" because "SDMA involves different users using the same physical communication channel in the same cell, separated only by angle" such that "When angular collisions between these users occur, one of them must quickly switch to another channel so that the connection is not broken" and thus "there will be much more intracell handovers than in conventional TDMA or CDMA systems."

'369 Patent	Lehne
	p. 6: From a smart antenna point of view it is much more efficient to position the base station away from the road or railway" so that "the spatial dimension is better exploited" as "illustrated in Fig. 6."  FIGURE 6. *Illustration of base station positioning along roads and railways: a) Traditional deployment; b) Possible smart antenna deployment.* *See, e.g.*, p. 6: "Electronically steerable antenna patterns are most often generated using array antennas. These are antennas consisting of a number of antenna elements on which the signal is divided or combined in both phase and amplitude." pp. 8-9: "Figure 12 shows schematically the elements of the reception part of a smart antenna" for an "antenna array" that "contains N elements" wherein "The N signals are being combined into one signal, which is the input to the rest of the receiver (channel decoding, etc.)"  FIGURE 12. *Reception part of a smart antenna.*

'369 Patent	Lehne
	p. 9: "Lehne also explains that "The signal processing unit will, based on the received signal, calculate the complex weights $w_1 - w_N$ with which the received signal from each of the array elements is multiplied" wherein "The weights can be optimized from two main types of criteria: maximization of received signal from the desired user (e.g., switched lobe or phased array) or maximization of the SIR by suppressing the signal from interference sources (adaptive array)" wherein "with M antenna elements one can "null out" $M - 1$ interference sources." p. 9: "The method for calculating the weights will differ depending on the type of optimization criterion" such as "When switched lobe (SL) is used the receiver will test all the pre-defined weight vectors (corresponding to the lobe set) and choose the one giving the strongest received signal level" but "If the phased array approach (PA) is used, which consists of directing a maximum gain beam toward the strongest signal component, the direction-of-arrival (DoA) is first estimated and then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the desired steering angle" wherein "A number of well documented methods exist for estimating the DoA." pp. 9-10: ""Figure 14 shows an example of the resulting antenna patterns for PA, SL, and AA in a case where both the signal and interference are measured in a real channel" wherein Lehne emphasizes for the "adaptive array" (or "AA") example to "Note how the AA directs nulls toward the strongest interference sources."  FIGURE 14. *Resulting antenna patterns for SL, PA, and AA for measured signal and interference channels. The figure also shows a so-called "fixed lobe" (FL) conventional antenna pattern for comparison.* p. 10: "The transmission part of the smart antenna will be schematically very similar to the reception part" as "shown in Fig. 16" wherein "The signal is split into N branches, which are weighted by the complex weights $z_1 - z_N$ in the lobe forming unit" and these "weights, which decide the radiation pattern in the downlink direction, are calculated by the signal processing unit"

'369 Patent	Lehne
	 FIGURE 16. *Transmission part of a smart antenna.* *See, e.g.*, p. 6: "Electronically steerable antenna patterns are most often generated using array antennas. These are antennas consisting of a number of antenna elements on which the signal is divided or combined in both phase and amplitude." p. 9: "Figure 12 shows schematically the elements of the reception part of a smart antenna" for an "antenna array" that "contains N elements" wherein "The N signals are being combined into one signal, which is the input to the rest of the receiver (channel decoding, etc.)"  FIGURE 12. *Reception part of a smart antenna.* p. 9: "Lehne also explains that "The signal processing unit will, based on the received signal, calculate the complex weights $w_1 - w_N$ with which the received signal from each of the array elements is multiplied" wherein "The weights can be optimized from two main types of criteria: maximization of received signal from the desired user (e.g., switched lobe or phased array) or maximization of the SIR

'369 Patent	Lehne
	by suppressing the signal from interference sources (adaptive array)" wherein "with M antenna elements one can "null out" $M - 1$ interference sources." p. 9: "The method for calculating the weights will differ depending on the type of optimization criterion" such as "When switched lobe (SL) is used the receiver will test all the pre-defined weight vectors (corresponding to the lobe set) and choose the one giving the strongest received signal level" but "If the phased array approach (PA) is used, which consists of directing a maximum gain beam toward the strongest signal component, the direction-of-arrival (DoA) is first estimated and then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the desired steering angle" wherein "A number of well documented methods exist for estimating the DoA." pp. 9-10: ""Figure 14 shows an example of the resulting antenna patterns for PA, SL, and AA in a case where both the signal and interference are measured in a real channel" wherein Lehne emphasizes for the "adaptive array" (or "AA") example to "Note how the AA directs nulls toward the strongest interference sources."  FIGURE 14. *Resulting antenna patterns for SL, PA, and AA for measured signal and interference channels. The figure also shows a so-called "fixed lobe" (FL) conventional antenna pattern for comparison.* p. 10: "The transmission part of the smart antenna will be schematically very similar to the reception part" as "shown in Fig. 16" wherein "The signal is split into N branches, which are weighted by the complex weights $z_1 - z_N$ in the lobe forming unit" and these "weights, which decide the radiation pattern in the downlink direction, are calculated by the signal processing unit"

'369 Patent	Lehne
	 FIGURE 16. *Transmission part of a smart antenna.* One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[a] identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device;	Lehne discloses identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device. For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the

'369 Patent	Lehne
	art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[b] determining at least one forward path pre-equalization parameter based on said at least one transmission delay; and	Lehne discloses determining at least one forward path pre-equalization parameter based on said at least one transmission delay. For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[c] modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where said modifying	Lehne discloses modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where said modifying includes selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal. For example, see the following passages and/or figures, as well as all related disclosures:

'369 Patent	Lehne
includes selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal.	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
2. The method as recited in claim 1, further comprising: receiving said reverse path data signal over at least one reverse transmission path.	Lehne discloses receiving said reverse path data signal over at least one reverse transmission path. For example, see the following passages and/or figures, as well as all related disclosures: As detailed in the citations in 1[p], Lehne teaches that a base station (transmitting device) transmits using antennas in the downlink (forward) path to remote devices and receives using antennas in the uplink (reverse) path from remote devices. See p. 4 ("(uplink means that the user is transmitting and the base station is receiving)."); ("directed antenna beams are used on the *downlink direction* (base station transmitting and user receiving)") See p. 8-10 (describing beamforming in uplink (receiver) and downlink (transmitter)) See Figures 13, 14, 15, 16 One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element

'369 Patent	Lehne
	explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
3. The method as recited in claim 2, further comprising: transmitting said modified forward path data signal over at least one forward transmission path.	Lehne discloses transmitting said modified forward path data signal over at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p] for data transmitted by base station using Lehne's antenna disclosure. See discussion in claim 2. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
4. The method as recited in claim 1, wherein said reverse path data signal	Lehne discloses wherein said reverse path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.

'369 Patent	Lehne
includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
5. The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	Lehne discloses The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data. For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

'369 Patent	Lehne
6. The method as recited in claim 5, wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data.	Lehne discloses wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
7. The method as recited in claim 6, further comprising: generating corresponding Quadrature Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data.	Lehne discloses generating corresponding Quadrature Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures: One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

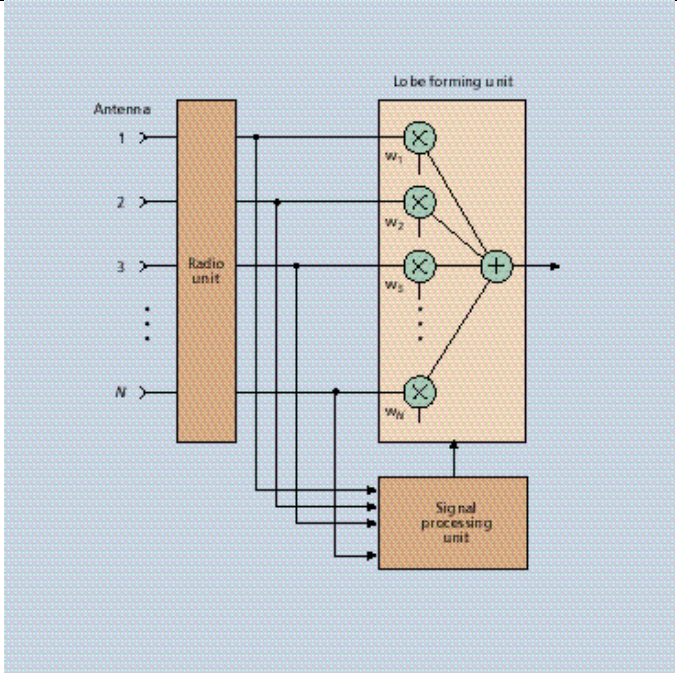
'369 Patent	Lehne
9. The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data.	Lehne discloses The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data. For example, see the following passages and/or figures, as well as all related disclosures: See p. 10 ("For the base station to be able to estimate the radio channel, a reference or training sequence is normally necessary, i.e., a known bit sequence must be transmitted periodically. The methods that maximize the SIR do in principle require knowledge of the instantaneous channel response from both the desired user and all the interference sources, which means the training sequence must be unique for each user. In the lobe forming unit the actual weighting of the received signal from each of the array elements is done. In the most advanced case this unit will be an integration of the channel equalizer/RAKE receiver and the smart antenna. In this case N·D weights will be required, where D is the number of symbol periods (depth) in the channel equalizer or number of fingers in the RAKE receiver. This is called a s p a t i o - t e m p o - ral filter [17, 18], because it removes the undesired signal components and keeps the desired ones both in time and space domains. Such a lobe forming unit is shown schematically in Fig. 15 [19]. In this example the number of weights is N·3 , showing that the depth of the equalizer is 3. The time between the taps on each antenna element is T. In a RAKE receiver, the time delay between the taps is not uniform. When the lobe forming is done digitally (after A/D) the lobe forming and signal processing units will normally be integrated in the same unit, namely the DSP. The separation in Fig. 12 is done to clarify the functionality. It is also possible to perform the lobe forming in hardware at radio frequency (R F) or intermediate frequency (IF) [20]." One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the

'369 Patent	Lehne
	state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Training Data references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
10. The method as recited in claim 9, further comprising: comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal.	Lehne discloses comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal. For example, see the following passages and/or figures, as well as all related disclosures: See claim 9. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Training Data references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
12. The method as recited in claim 3, wherein said at least one reverse transmission path is substantially reciprocal to said at least one	Lehne discloses wherein said at least one reverse transmission path is substantially reciprocal to said at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures:

'369 Patent	Lehne
forward transmission path.	See discussion of 1[p], 1[a], 1[b] describing that the base station is a transmitting device (e.g., for the downlink OFDM symbols) and that it also determines the pre-equalization parameter and performs the modification of the forward path (downlink) data signal based on the reverse link. The use of the reverse link channel conditions in Lehne to adapt the forward path transmissions discloses this claim. Lehne discloses TDD and using reverse path channel response to predict forward path channel response, which a POSITA would understand to necessarily disclose the limitations of this claim element. E.g., Lehne at 10 ("In a time division duplex (TDD) system the mobile station and base station use the same carrier frequency only separated in time. In this case the weights calculated on uplink will be optimal on downlink if the channel does not change during the period from uplink to downlink transmission."). Indeed, the '369 acknowledges that reciprocity was already well-known prior to the '369 patent, particularly for TDD channels. See '369 patent at 7:22-34 ("**As is well known**, many materials are electromagnetically isotropic, which is a property resulting from symmetry in their associated permittivity and permeability tensors. The Lorentz Reciprocity Theorem applies to such materials. Refraction and dielectric reflection from materials therefore often show reciprocity, or equivalence of forward and reverse channel characteristics. Diffraction and reflection are inherently reciprocal due to the minimal media affecting the electromagnetic wave. Thus, reciprocity can be used to determine channel characteristics that are used while pre-equalizing a transmitted path. The use of a reciprocal channel is very useful, for example, when Time Division Duplex (TDD) channels are implemented."). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly,

'369 Patent	Lehne
	the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
13. The method as recited in claim 1, wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device.	Lehne discloses wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p] showing how the base station transmits using the smart antenna including the arrays performing beam forming. A base station is a transmitting device. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
14. The method as recited in claim 13, wherein said transmitting device includes a base station device that is operatively configured	Lehne discloses wherein said transmitting device includes a base station device that is operatively configured for use in a wireless communication system. For example, see the following passages and/or figures, as well as all related disclosures: See claim 13.

'369 Patent	Lehne
for use in a wireless communication system.	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
15. The method as recited in claim 13, further comprising: using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device.	Lehne discloses using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: As detailed in the citations in 1[p], Lehne teaches that a base station (transmitting device) transmits using antennas in the downlink (forward) path to remote devices and receives using antennas in the uplink (reverse) path from remote devices. See p. 4 ("(uplink means that the user is transmitting and the base station is receiving)."); ("directed antenna beams are used on the *downlink direction* (base station transmitting and user receiving)") See p. 8-10 (describing beamforming in uplink (receiver) and downlink (transmitter)) See Figures 12, 13, 14, 15, 16

'369 Patent	Lehne
	 Figure 12. Reception part of a smart antenna. See p. 8-10 ("RECEIVER Figure 12 shows schematically the elements of the reception part of a smart antenna. The antenna array contains *N* elements. The *N* signals are being combined into one signal, which is the input to the rest of the receiver (channel decoding, etc.). As the figure shows, the smart antenna reception part consists of four units. In addition to the antenna i tself it contains a radio unit, a lobe forming unit, and a signal processing unit [13]. The array will often have a relatively low number of elements in order to avoid unnecessarily high complexity in the signal processing. Figure 13 shows four examples of different array geometries. The

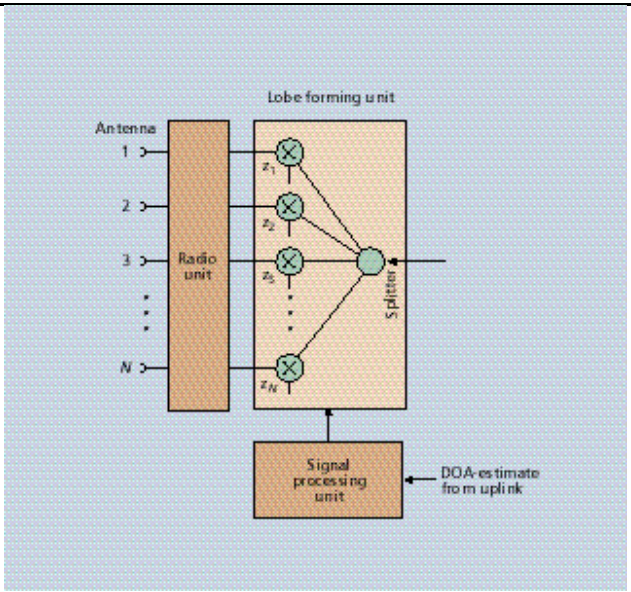
'369 Patent	Lehne
	first two structures are used for beamforming in the hori zontal plane (azimuth) only. This will normally be sufficient for outdoor environments, at least in large cells. The first example (a) shows a one-dimensional linear array with uniform element spacing of D*x*. This structure can perform beamforming in azimuth angle within an angular sector. This is the most common structure due to its low complexity. The second example (b) shows a birds eye view of a circular array with angular element spacing of D F= 2p/*N*. This structure can perform beamforming in all azimuth angles. The last two structures are used for performing two-dimensional beamforming, in both azimuth and elevation angles . This may be desirable for indoor or dense urban environments. Figure 13c is the front view of a twodimensional linear array with horizontal element spacing of D *x* and vertical element spacing of D *z*. This structure can perform beamforming within a solid angle. Beamforming in the entire space, within all solid angles, requires some sort of cubic or spherical structure. Figure 13d shows an example of a cubic structure with element separations of D *x*, D*y* and D *z*. The radio unit consists of down-conversion chains and (complex) analog-to-digital conversion (A/D). There must be *N* down-conversion chains, one for each of the array elements. The signal processing unit will, based on the received signal, calculate the complex weights *w*1 – *wN* with which the received signal from each of the array elements is multiplied. These weights will decide the antenna pattern in the uplink direction as described in the previous section. The weights can be optimized from two main types of criteria: maximization of received signal from the desired user (e.g., switched lobe or phased array) or maximization of the SIR by suppressing the signal from interference sources (adaptive array). In theory, with *M* antenna elements one can "null out" *M*– 1 interference sources, but due to multipath propagation this number will normally be lower. The method for calculating the weights will differ depending on the type of optimization criterion. When *switched lobe* (SL) is used the receiver will test all the pre-defined weight vectors (corresponding to the lobe set) and choose the one giving the strongest received signal level. If the *phased array* approach (PA) is used, which consists of directing a maximum gain beam toward the strongest signal component, the *d i r e c - t i o n - o f - a r r i v a l* (DoA) is first estimated and then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the

'369 Patent	Lehne
	desired steering angle. A number of well documented methods exist for estimating the DoA, for instance, MUSIC, ESPRIT, or SAGE [4, 14].") One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
19. The method as recited in claim 15, wherein said transmitting device is operatively coupled to a plurality of first device receive antennas.	Lehne discloses wherein said transmitting device is operatively coupled to a plurality of first device receive antennas. For example, see the following passages and/or figures, as well as all related disclosures: See claim 15. Lehne's base station uses one or more antennas, including arrays, to receive and transmit data. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM

'369 Patent	Lehne
	Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
21. The method as recited in claim 15, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna.	Lehne discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna. For example, see the following passages and/or figures, as well as all related disclosures: See citations for claim 15 including discussion on pp 8-10 of Lehne discussing the ability to determine angle of receiving and use that angle subsequently. P. 4 (using "direction of arrival" ("DoA")); "*Dynamically phased array (PA)*: By including a *direction of arrival* (DoA) algorithm for the signal received from the user, continuous tracking can be achieved and it can be viewed as a generalization of the switched lobe concept. In this case also, the received power is maximized."); P. 9 ("This structure can perform beamforming in azimuth angle within an angular sector. This is the most common structure due to its low complexity. The second example (b) shows a birds eye view of a circular array with angular element spacing of D F= 2p/*N*. This structure can perform beamforming in all azimuth angles. The last two structures are used for performing two-dimensional beamforming, in both azimuth and elevation angles . This may be desirable for indoor or dense urban environments. Figure 13c is the front view of a twodimensional linear array with horizontal element spacing of D *x* and vertical element spacing of D *z*. This structure can perform beamforming within a solid angle. Beamforming in the entire space, within all solid angles, requires some sort of cubic or spherical structure. Figure 13d shows an example of a cubic structure with element separations of D *x*, D*y* and D *z*. … The method for calculating the weights will differ depending on the type of optimization criterion. When *switched lobe* (SL) is used the receiver will test all the pre-defined weight vectors (corresponding to the lobe set) and choose the one giving the strongest received signal level. If the *phased array*

'369 Patent	Lehne
	approach (PA) is used, which **consists of directing a maximum gain beam toward the strongest signal component, the *direction-of-arrival* (DoA) is first estimated and then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the desired steering angle. A number of well documented methods exist for estimating the DoA, for instance, MUSIC, ESPRIT, or SAGE** [4, 14].") See p. 10 on transmitting ("Thus optimum beamforming (i.e., AA) on downlink is difficult, and the technique most frequently suggested is the geometrical approach of estimating the direction-of-arrival (DoA). The assumption is directional eciprocity, i.e., the direction from which the signal arrived on the uplink is the direction in which the signal should be transmitted to reach the user on downl ink. This assumption has been strengthened by recent experimental results [21]. The strategy used by the base station is to estimate the DoA of the direction (or directions) from which the main part of the user signal is received. This direct ion i s used on downlink by choosing the weights z1– zN so that the radiation pattern is a lobe (or lobes) directed toward the desired user. This is similar to PA. In addition, it is possible to position zeros in the direction toward other users so that the interference suffered by these users is minimized. Due to fading on the different signal paths, it has been suggested to choose the downlink direction based on averaging the uplink channel over a period of time [11]. This will, however, be sub-optimum compared to the uplink situation where knowledge about the instantaneous radio channel is available. It should be stressed that in the discussion above.") See Figure 16 (DOA estimate from uplink as an input into the signal processing unit); P. 11("The strategy of directing the lobe (or lobes) in the direction(s) of the user signal DoA is often used…") See p. 4 (allowing multiple users on same channel separated by angle (which implies knowledge of the angle of arrival); p. 5 (same); See Figure 7 which shows average of power received from the azimuth antenna view angles. See pp. 6-7 explaining Figure 7.

'369 Patent	Lehne
	See Figure 9 (using the phase angle of each element to steer the lobe). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
28. The method as recited in claim 13, further comprising: using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device.	Lehne discloses using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15 regarding Lehne's base station usage of one or more antennas to transmit signals to receiving devices. See pp. 10-11 discussing "transmitter" See Figure 16:

'369 Patent	Lehne
	 Figure 16. Transmission part of a smart antenna. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
32. The method as recited in claim 28, further comprising:	Lehne discloses setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.

'369 Patent	Lehne
setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21. Lehne teaches the pointing parameter in multiple different ways. First, the transmitters can do beam forming which effectively points the antenna and this is based on the channel estimate created through receiving information. See pp. 10-11. See p. 3-4 discussing "Basic Principles" and identifying multiple ways to steer (point) and antenna. See pp. 6-7 (discussing section of "Array Antennas" including "Electronically steerable antenna patterns are most often generated using array antennas. These are antennas consisting of a number of antenna elements on which the signal is divided or combined in both phase and amplitude. Generally, any combination of elements can form an array. However, usually equal elements in a regular geometry are used.") See Figure 9 (using the phase angle of each element to steer the lobe); See p. 8 ("it is desired to steer the main lobe of the antenna in a certain direction, j." … and then providing the techniques to effectuate the steering). See page 9 (beam forming and "then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the desired steering angle.") See Figure 2 ("steearable lobe") One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the

'369 Patent	Lehne
	art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
33. The method as recited in claim 28, further comprising: setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	Lehne discloses setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21, claim 32. The receive information is used by the channel estimation which is then used to form the weights that direct the beams that direct the phased antennas. See p. 4 (Levels of Intelligence section discussing use of "Dynamically Phased Array" and "phased arrays"); P. 9 (discussing use of "phased array" and calculation of weights to be used for transmissions); P. 6-7 (discussion of Array antennals and electronically steerable antenna patterns combine in by phase and amplitude); One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly,

'369 Patent	Lehne
	the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
35. The method as recited in claim 28, further comprising: selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device.	Lehne discloses selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21, claim 32. Lehne's base stations including one or more antennas used for transmitting signals to the receiving devices. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
36. The method as recited in claim 35, further comprising: selectively transmitting a plurality of beams using two or more transmitting device transmit antennas.	Lehne discloses selectively transmitting a plurality of beams using two or more transmitting device transmit antennas. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21, claim 32. Lehne's base station uses the transmit antennas to transmit a plurality of beams.

'369 Patent	Lehne
	See Figures 1, 3, 6, 9, 10, 14, 15 all showing plurality of beams resulting from the transmitting (as shown in Figures 15, 16 using two or more antennas); p. 10 ("In the lobe forming unit the actual weighting of the received signal from each of the array elements is done.") p. 4 (smart antenna is "a number of radiating elements…" that create the beams/lobes); p. 4 (all elements can be used for diversity combining). P. 6 ("The technology is based on array antennas where the radiation pattern is altered by adjusting the amplitude and relative phase on the different array elements…. Electronically steerable antenna patterns are most often generated using array antennas. These are antennas consisting of a number of antenna elements on which the signal is divided or combined in both phase and amplitude.") P. 7 (formulas using the different elements for transmission); p. 8 ("Thus, we want the farfield signals from all the elements of the array to be added *in phase* in the wanted direction.") See p. 8 Practical Considerations. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

'369 Patent	Lehne
37. The method as recited in claim 36, wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device.	Lehne discloses wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21, claim 32, claim 36 Lehne's base station uses the transmit antennas to transmit a plurality of beams that seek to direct the transmissions to the specific receiving device and null out other transmissions paths. P. 7 ("The total radiation pattern is given by the *element type*, the *relative positions* and the excitation (amplitude and phase). Using an array antenna, it is possible to obtain a very good control of the radiation pattern, e.g., the shape of the main lobe and the side lobe level (SLL). The radiation pattern is uniquely given by the aforementioned parameters.") P. 8 (adjustment of phase and amplitude to create beam patterns); P. 9 ("If the *phased array* approach (PA) is used, which consists of directing a maximum gain beam toward the strongest signal component, the *direc-tion-of-arrival* (DoA) is first estimated and then the weights are calculated as described in the previous section with uniform amplitude and phase in accordance with the desired steering angle") See Figure 17. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly,

'369 Patent	Lehne
	the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
41. The method as recited in claim 1, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data.	Lehne discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], claim 15, claim 21, claim 32, claim 36 Lehne's base station uses the transmit antennas to transmit a plurality of beams that seek to direct the transmissions to the specific receiving device and null out other transmissions paths. As discussed for claims 9-10, Lehne teaches that the channel conditions / estimation is based on the reverse path signals which contribute to the creation of the weights used for transmission. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification and Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.